Nematodes 3

BVM&S Parasitology
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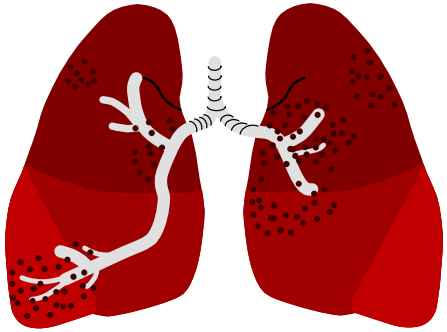
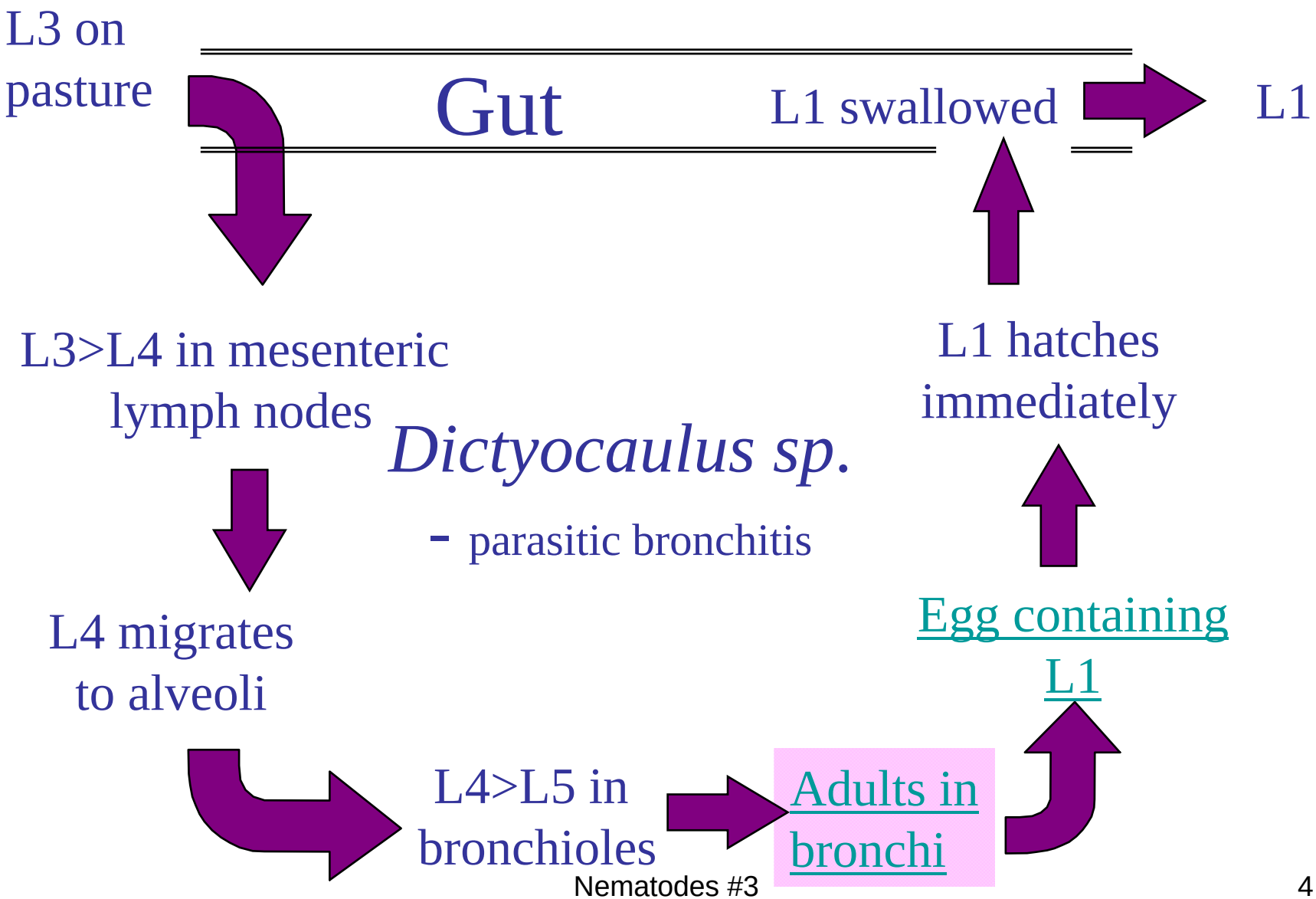
Lecture topics

- The Lungworms
  - Direct & indirect life cycles
  - Vaccination
- Arthropod-borne nematodes
  - Mosquito-borne
  - Musca
- Trichinella
  - One-host permanent parasite
  - Obligate hypobiosis
- Nematodes revisited

Main features of the lungworms



- Infection via the gut affecting cattle, sheep, equines, poultry
- Males have a bursa
- Larvae **migrate** to lungs via liver eggs/larvae then pass out via faeces – infection via ensheathed L_3
- Life cycles
  - Direct - *Dictyocaulus*, *Syngamus*
  - Indirect - *Metastrongylus*, *Mullerius*

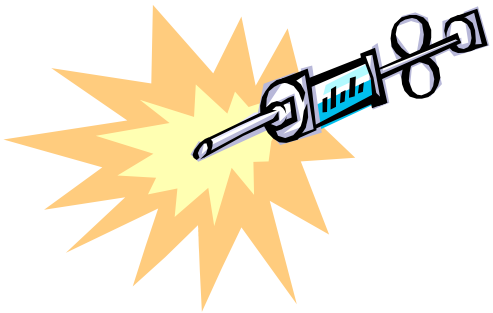

L3 on pasture
Gut
L1 swallowed
L1
L3>L4 in mesenteric lymph nodes
L1 hatches immediately
Dictyocaulus sp.
- parasitic bronchitis
L4 migrates to alveoli
Egg containing L1
L4>L5 in bronchioles
Adults in bronchi

Hitch-hiking parasites

- L3 use the “shotgun fungus” (*Pilobolus*) to travel away from the faecal pat - ~ 10ft.
- Overcomes avoidance of grazing near faecal pats.
- Spores of *Pilobolus* needs to pass through cattle gut before they can “germinate”

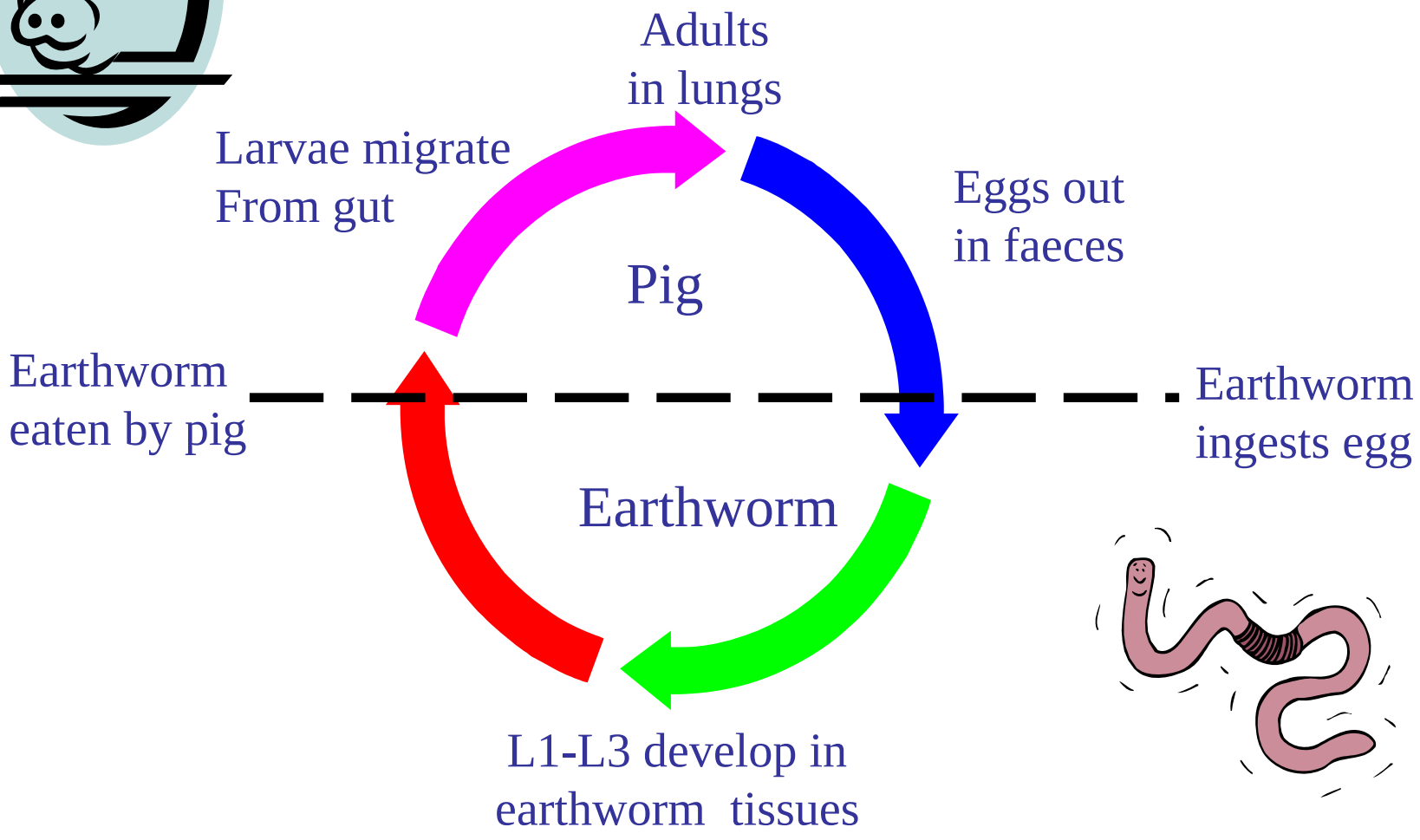
The fabulous flying fungus

Controlling *Dictyocaulus* in cattle



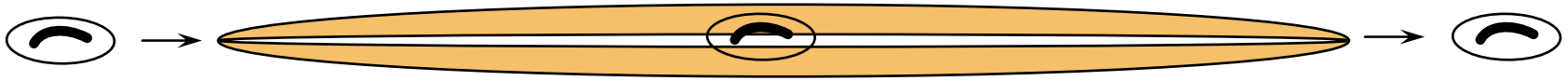
- Anthelmintics – are they just too effective (for now?)
- Vaccination with Dictol™ or Huskvac™
  - Live, irradiated L_3
  - Available since 1950 - first commercially available helminth vaccine.
  - Falling in efficacy due to?
    - Reduced use of vaccine/overdependence on antheminthics
    - More over wintered larvae on a pasture due to climate change
- Pasture management not really an option as epidemiology not well understood

Metastrongylus



The Earthworm As a Host for Nematodes

Transport host



L2 in egg — Egg in gut — L2 in egg

Paratenic host - an accumulator

L2 in egg — L2 in tissues

Intermediate host

L1 in egg — L1 to L3 in tissues of earthworm

Arthropod-bone nematodes – the filarial worms

- Transmitted by insects
- Indirect life cycles
- Permanent parasites
  - Adults in blood or connective tissues
  - Larval stages called – microfilaria
- Two important species
  - *Dirofilaria: heartworm of dogs & cats*
  - *Parafilaria: cattle & horses*

Dirofilaria – a heartworm

Adults in pulmonary arteries & right ventricle of the heart

Larvae in connective tissue

Microfilariae (L1) released into the In blood

Dog/cat

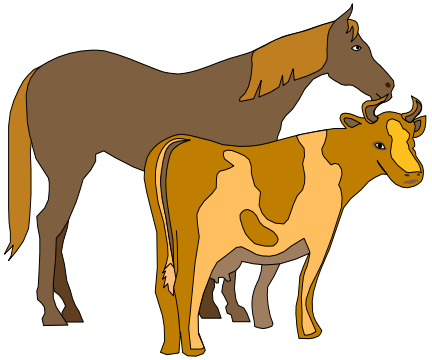
Mosquito

Larvae migrate to salivary glands

Larvae develop in tissues of vector

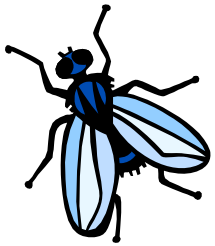
Parafilaria

Adults in “verminous” nodules in skin

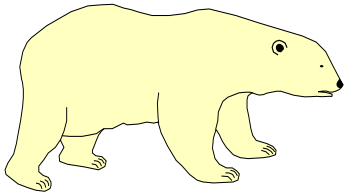


Microfilarial stages in “bloody” secretions - *verminous haemorrhagic dermatitis*

Intermediate host - *Musca sp*

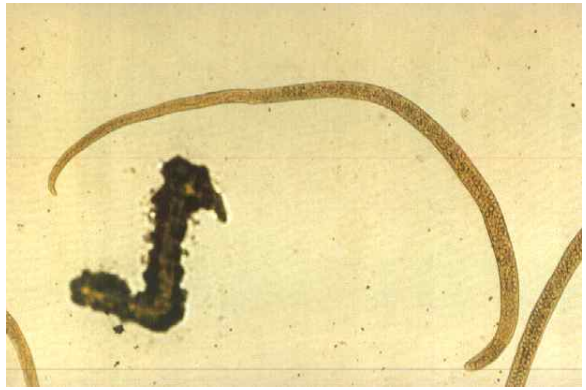


Trichinella spiralis

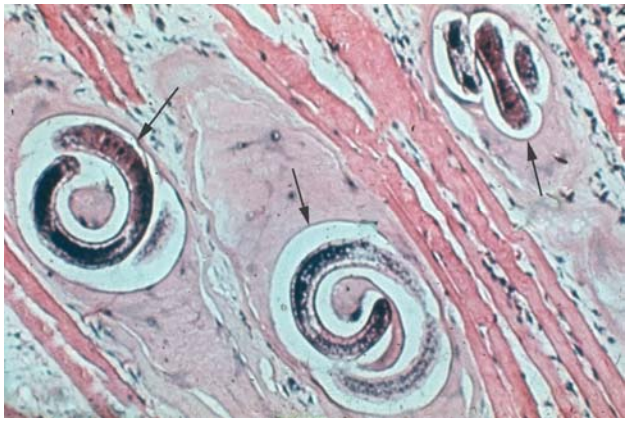


- Parasite of carnivores
- L_1 migrate from the gut and become **hypobiotic** inside the cells of skeletal muscles of the host.
- Wide host range.
- Important zoonosis.

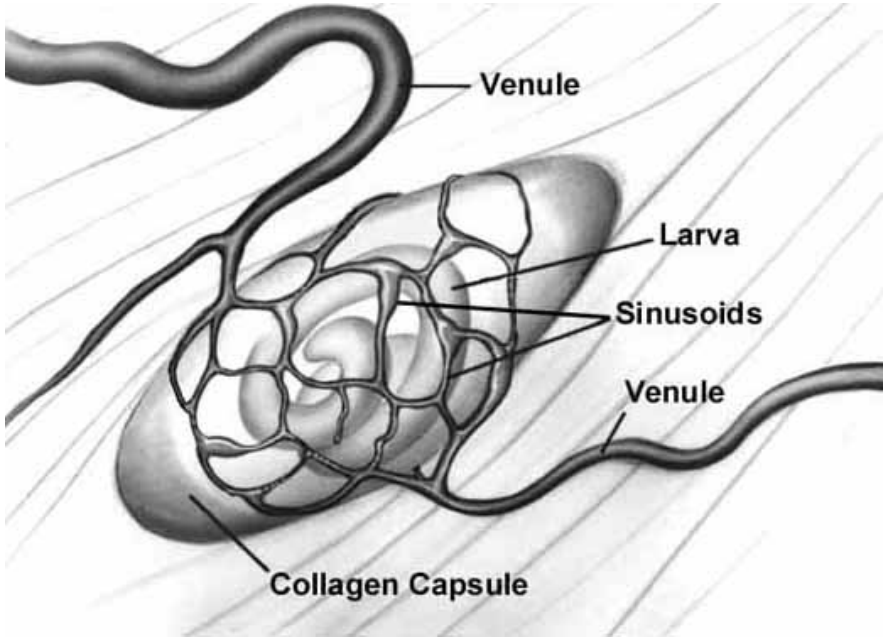
Trichinella



Short-lived adult from gut

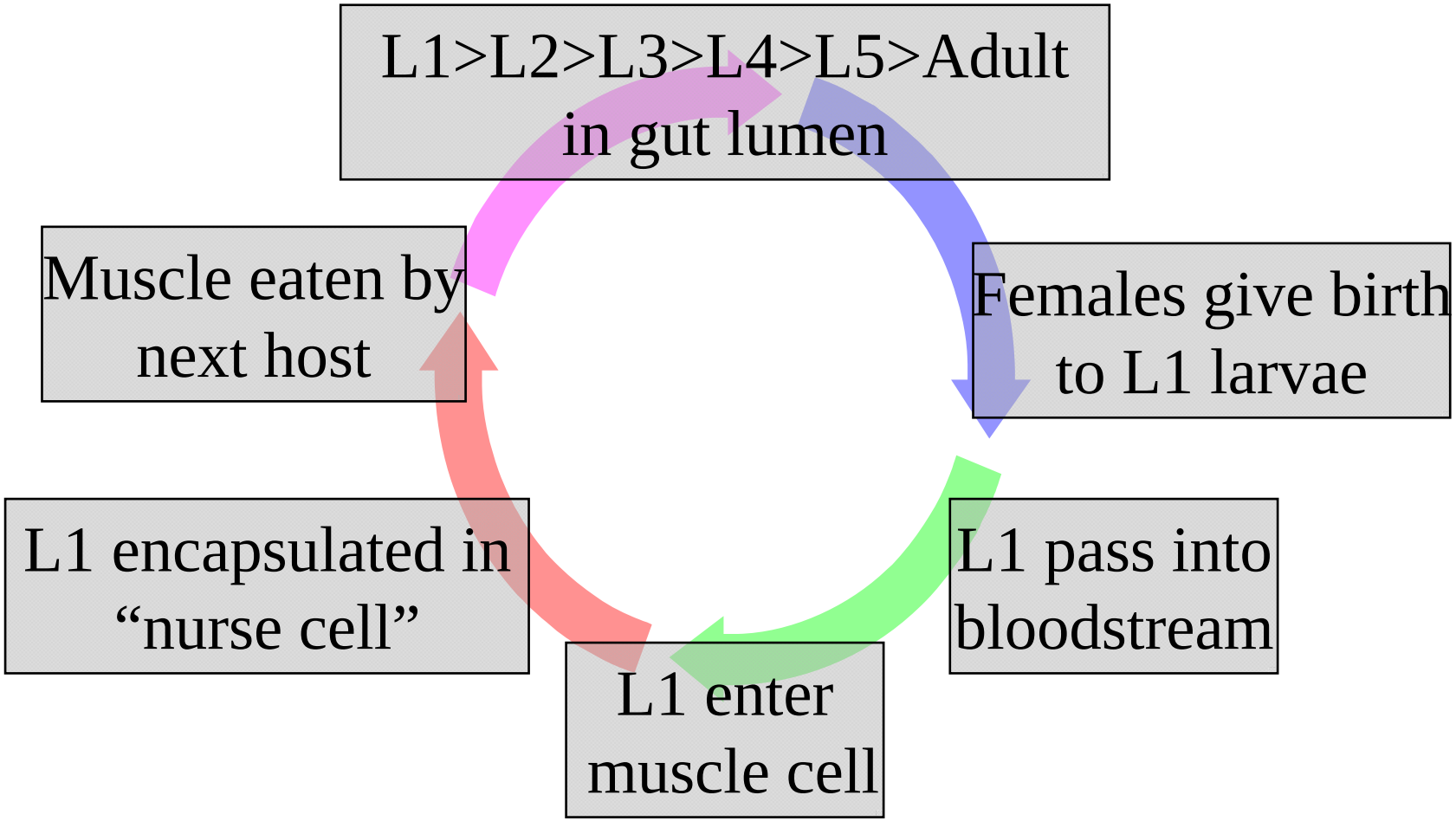


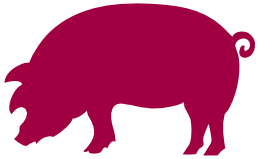
Long-lived hypobiotic L_1 stage inside muscle cell



Structure of nurse cell which can remain viable for up to 30 years in humans

Trichinella spiralis

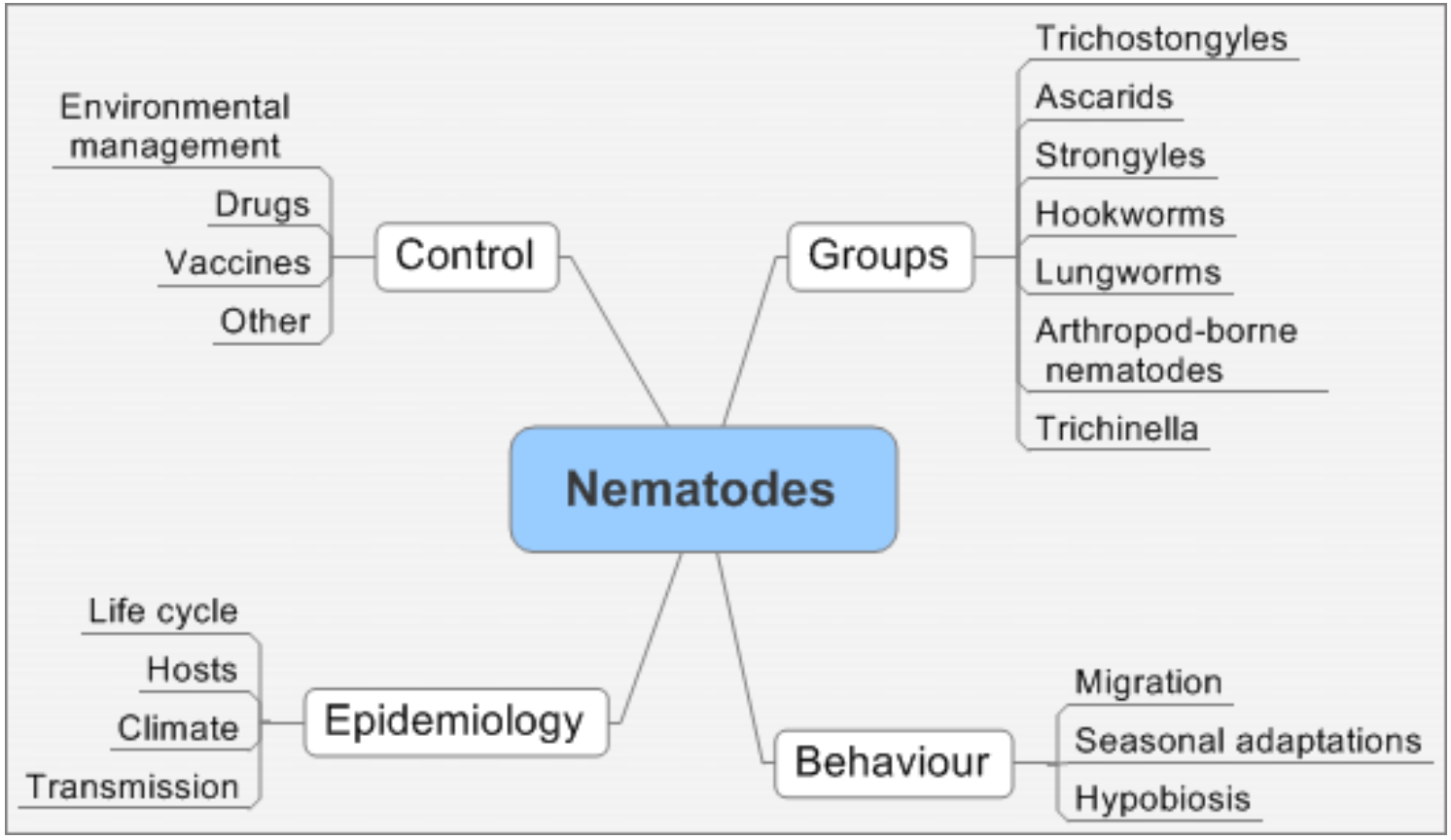




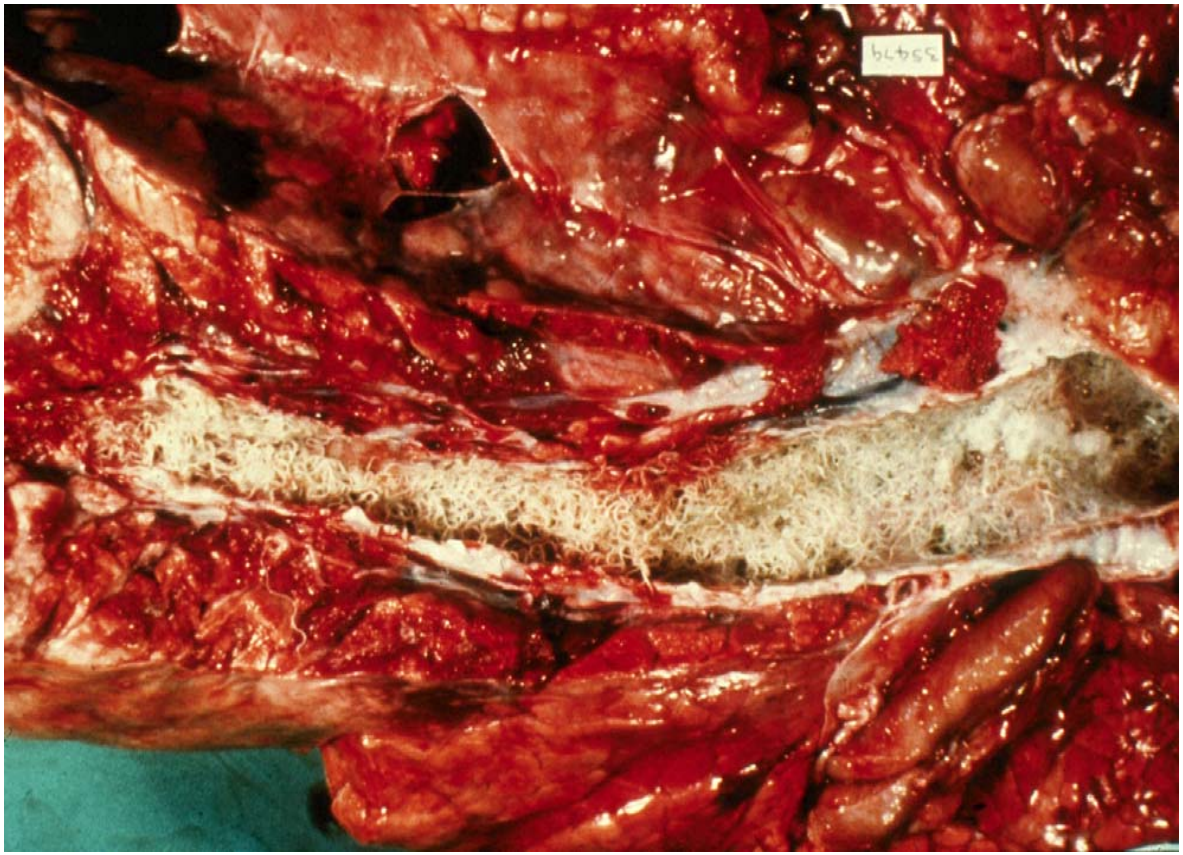
T.spiralis - zoonosis

- Pigs infected.
  - When fed food waste containing infected meat.
  - Tail biting.
- Humans becomes infected by eating **undercooked pork** containing encysted L_1.
- Rats in piggeries can maintain a secondary cycle.

The nematodes revisited



Adult lungworm



Lungworm egg